

US EPA ARCHIVE DOCUMENT

Data Evaluation Report on the Acute Toxicity of Iodomethane (TM-425) to Freshwater Invertebrates - *Daphnia magna*

PMRA Submission Number{.....}

EPA MRID Number 45593713

Data Requirement: PMRA DATA CODE {.....}
EPA DP Barcode D280800
OECD Data Point
EPA MRID 45593713
EPA Guideline 72-2

Test material: Iodomethane (TM-425)
Common name: Iodomethane (TM-425)
Chemical name: Not reported
CAS name: Not reported
CAS No.: Not reported
Synonyms: Not reported

Purity: 99.7%

Primary Reviewer: Rebecca Bryan
Staff Scientist, Dynamac Corporation

Signature: Rebecca Bryan
Date: 3/28/02

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{EPA/OECD/PMRA}

Date: {.....}

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Company Code {.....} [For PMRA]
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EPA PC Code 000011

Date Evaluation Completed: {dd-mmm-yyyy}

CITATION: Drott K.R., T.Z. Kendell, and H.O. Krueger. 2001. Iodomethane (TM-425): A 48 -Hour Static Renewal Acute Immobilization Test with the Cladoceran (*Daphnia magna*). Unpublished study performed Wildlife International, Ltd., Easton, Maryland, Laboratory Project Number 443A-106 and sponsored by Arvesta Corporation, San Francisco, California. Completed December 4, 2001.



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EXECUTIVE SUMMARY:

The 48-hr acute toxicity of Iodomethane (TM-425) to *Daphnia magna* was studied under static renewal conditions. Dilution water control served as a comparison to five nominal concentrations of 0 (control), 0.025, 0.083, 0.28, 0.91, and 3.0 mg/L. Mean measured concentrations were <0.020, 0.022, 0.073, 0.26, 0.78, and 2.3 mg/L. After 48 hours, there were 15, 55, and 100% dead and immobile daphnids in the 0.26, 0.78, 2.3 mg/L treatment groups, respectively. The 48-hour EC₅₀ was 0.57 mg/L, categorizing Iodomethane (TM-425) as highly toxic to *Daphnia magna* neonates on an acute toxicity basis. The 48-hr NOEC was 0.073 mg/L, based on mortality and immobility. The LC₅₀, based on confirmed dead daphnids, was 1.34 mg/L.

This study is scientifically sound and satisfies the guideline requirements for an acute toxicity study with freshwater invertebrates (US EPA FIFRA, Subdivision E, 72-2). This study is classified as Core.

Results Synopsis

Test Organism Age (eg. 1st instar): <24 hours old
Test Type (Flow-through, Static, Static Renewal): Static Renewal

LC50: 1.34 mg/L	95% C.I.: 0.78-2.3 mg/L
EC50: 0.57 mg/L	95% C.I.: 0.43-0.79 mg/L
NOEC: 0.073 mg/L	

I. MATERIALS AND METHODS REPORTED

GUIDELINE FOLLOWED: Subdivision E, §72-2. The following deviations were noted by reviewer(s):

1. The test solution pH ranged substantially higher (8.3 to 8.5) than the pH recommended by US EPA SEP (1985) guidelines (7.2 to 7.6).
2. Water hardness was higher (126 mg/L as CaCO₃) than recommended (40-48 mg/L as CaCO₃).
3. The aquarium size (500 mL) and fill volume (500 mL) were significantly greater than recommended by US EPA (250 and 200 mL, respectively).
4. No pretest mortality was reported.

Deviations in water quality (pH and water hardness) are not considered sufficient to prevent Core status (confirmed via discussions with M. Rexrode and R. Pisigan of EFED). Fill volume was due to the volatility of Iodomethane.

COMPLIANCE: Signed and dated Good Laboratory Practice, Quality Assurance, and No Data Confidentiality Statements were provided.

A. MATERIALS:

1. Test Material Iodomethane, TM-425

Description: Liquid

Lot No./Batch No. : 007403/02

Purity: 99.7%

Stability of Compound

Under Test Conditions: Test concentrations were measured at 0 and 24 hours for fresh media and at 24 and 48 hours for the expired media. The mean recovery of the test substance from samples of fresh and expired solutions ranged from 77-93% of the nominal concentrations (Table 1), showing that they were relatively stable under test conditions.

(OECD requires water solubility, stability in water and light, pKa, Pow, vapor pressure of test compound)

Storage conditions of

test chemicals: Stored at ambient room temperature and out of direct sunlight.

2. Test organism:

Species: *Daphnia magna*

EPA preferred species is Daphnia magna

Age at test initiation: <24 hours old

Source: In-house culture

B. STUDY DESIGN:

1. Experimental Conditions

a) Range-finding Study: A range-finding test was not reported.

b) Definitive Study

Table 1. Experimental Parameters

Parameter	Reported Details	Remarks
		Criteria
Acclimation period:	14 days, neonates from 5 adults used in test.	EPA requires 7 day minimum acclimation period No feeding during study
Conditions: (same as test or not)	Same as test.	
Feeding:	Adults fed mixture of yeast, Cerophyll®, trout chow, and freshwater green alga, <i>Selenastrum capricornutum</i> , prior to study. No feeding during the study.	
Health: (any mortality observed)	Adults showed no signs of disease or stress.	
Duration of the test	48 hours	Shorter test duration than required.
		EPA requires 96 hours
Test condition static/flow through	Static Renewal	EPA requires consistent flow rate of 5 - 10 volumes/24 hours, meter systems calibrated before study and checked twice daily during test period
Type of dilution system- for flow through method.	N/A	
Renewal rate for static renewal	Daily	
Aeration, if any	None	
<u>Test vessel</u>		The test vessel size and fill volume was greater than recommended.
Material: (glass/stainless steel)	Glass, Teflon®-lined lids	EPA requires: size 250 ml or 3.9 L fill 200 ml
Size:	500 mL	
Fill volume:	500 mL	

Parameter	Reported Details	Remarks
		Criteria
Source of dilution water	Filtered, freshwater from well.	<i>EPA requires soft reconstituted water or water from a natural source, not dechlorinated tap water.</i>
<u>Water parameters:</u> Hardness pH Dissolved oxygen Temperature Total Organic Carbon Particulate matter Metals Pesticides Chlorine	126 mg/L as CaCO ₃ * (0 hr) 8.3 to 8.5* 8.8-9.1 mg/L* (>95%) 20.5-20.6°C* <1 mg C/L* (0 hr) See Appendix 3, p. 42-43. See Appendix 3, p. 42-43. See Appendix 3, p. 42-43. Not reported. *Table 2 (p. 20)	Water hardness was higher than required by EPA. The pH was higher than recommended. <i>EPA requires:</i> hardness: 40 - 48 mg/L as CaCO ₃ pH: 7.2 - 7.6 -Temperature: 20°C (measured continuously or if water baths are used, every 6 hr, may not vary > 1°C Dissolved oxygen: Static: ≥ 60% during 1 st 48 hr and ≥ 40% during 2 nd 48 hr Flow-through: ≥60%
Number of replicates Solvent control: Negative control: Treatments:	N/A 2 2	
Number of organisms per replicate Solvent control: Negative control: Treatments:	N/A 10 10	Five treatment levels plus water control with 20 <i>Daphnia</i> per treatment. <i>EPA requires 5 treatment levels plus control with a minimum of 20 daphnid per treatment. Biomass loading rate for static ≤ 0.8 g/L at ≤ 17°C, ≤ 0.5 g/L at > 17°C; flow-through: ≤ 1 g/L/day.</i>

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Parameter	Reported Details	Remarks
		Criteria
Treatment concentrations nominal:	0.025, 0.083, 0.28, 0.91, and 3.0 mg/L	Measured concentrations are the average of old and new test solutions. <i>EPA requires a geometric series with each concentration being at least 60% of the next higher one.</i>
measured:	0.022, 0.073, 0.26, 0.78, and 2.3 mg/L	
Solvent (type, percentage, if used)	None	<i>EPA requires solvents not to exceed 0.5 ml/L for static tests or 0.1 ml/L for flow-through tests.</i>
Lighting	16 hours light/8 hours dark	<i>EPA requires 16 hours light, 8 hours dark.</i>
Stability of chemical in the test system	Mean analyzed concentrations from fresh and expired solutions were 77-93% of nominal concentrations.	
Recovery of chemical	77-93% (average)	Several measured samples from the nominal 0.025 mg/L concentration were below the limit of quantitation.
Level of Quantitation	0.02 mg/L	
Level of Detection	Not reported.	
Positive control {if used, indicate the chemical and concentrations}	None	
Other parameters, if any	None	

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2. Observations:

Table 2: Observations

Criteria	Reported Details	Remarks
		Criteria
Parameters measured including the sublethal effects	Mortality, inability to swim and/or immobility, and sublethal effects.	
Observation intervals	Every 24 hours.	
Were raw data included?	No	
Other observations, if any	None	

II. REPORTED RESULTS AND DISCUSSION

A. TOXICITY ENDPOINTS:

One daphnid was missing and assumed dead in the control. After 48 hours, there were 15, 55, and 100% immobile or dead daphnids in the 0.26, 0.78, 2.3 mg/L treatment groups, respectively. One lethargic daphnid was observed in the 2.3 mg/L treatment after 24 hours.

Table 3: Sublethal Effect (and Mortality) of Iodomethane (TM-425) on *Daphnia magna*.

Nominal and (measured) Concentrations (mg/L)	Observation period			
	24 hours		48 hours	
	endpoint	% affected	endpoint	% affected
Dilution water control	Mortality	5	Mortality	5
0.025 (0.022)	None	0	None	0
0.083 (0.073)	None	0	None	0
0.28 (0.26)	None	0	Mortality Immobile	5 10
0.91 (0.78)	None	0	Immobile	55
3.0 (2.3)	Mortality Lethargic	10 5	Mortality	100
NOEC mg/L	0.78		0.073	
LOEC mg/L	2.3		0.26	

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Nominal and (measured) Concentrations (mg/L)	Observation period			
	24 hours		48 hours	
	endpoint	% affected	endpoint	% affected
EC ₅₀ mg/L	>2.3		0.57	

B. REPORTED STATISTICS:

The study author reported that the EC₅₀ value was calculated using the computer program of C.E. Stephan, which provides output for the probit analysis, the moving average method, and binomial probability with nonlinear interpolation. In this study, the moving average method was used to determine the EC₅₀ (for dead and immobile daphnids) and the LC₅₀ was not determined. The criteria for establishing the no-observed effect level was based on direct inspection of the data.

C. VERIFICATION OF STATISTICAL RESULTS:

Statistical Method: Mortality and immobility data were summed to determine the EC₅₀, which was estimated using the moving average angle method via Toxanal software. The LC₅₀ (for dead daphnids) was estimated using the same method and program. The NOEC was determined visually.

LC50: 1.34 mg/L

95% C.I.: 0.78-2.3 mg/L

EC50: 0.57 mg/L

95% C.I.: 0.43-0.79 mg/L

NOEC: 0.073 mg/L

D. STUDY DEFICIENCIES:

This study generally followed the guidelines of USEPA SEP (1985) acute toxicity for a freshwater invertebrate using *Daphnia magna* neonates. The pH (8.3 to 8.5) and water hardness (126 mg/L as CaCO₃) were higher than recommended by US EPA SEP (1985) guidelines (7.2 to 7.6 and 40-48 mg/L as CaCO₃). However, these deviations are not considered sufficient to prevent Core status (confirmed via discussions with M. Rexrode and R. Pisigan of EFED). Other minor deviations that did not affect the acceptability or the validity of the study included, the aquarium size (500 mL) and fill volume (500 mL) were significantly greater than recommended by US EPA (250 and 200 mL, respectively) and no pretest mortality was reported.

E. REVIEWER'S COMMENTS:

The reviewer's conclusions were identical to the study authors'. The 48-hour EC₅₀ (based on dead and immobile daphnids) was 0.57 mg/L, categorizing Iodomethane (TM-425) as highly toxic to *Daphnia magna* neonates on an acute toxicity basis. The 48-hr NOEC was 0.073 mg/L, based on mortality and immobility. The reviewer determined the LC₅₀ to be 1.34 mg/L, based on dead daphnids.

G. CONCLUSIONS:

This study is scientifically sound and satisfies the guideline requirements for an acute toxicity study with freshwater invertebrates (US EPA FIFRA, Subdivision E, 72-2). This study is classified as Core. After 48 hours, there were 15, 55, and 100% immobile or dead daphnids in the 0.26, 0.78, 2.3 mg/L treatment groups, respectively. The 48 hour EC₅₀ was 0.57 mg/L, which categorizes Iodomethane (TM-425) as highly toxic to daphnids on an acute toxicity basis. The NOEC was 0.073 mg/L, based on mortality and immobility at the 0.26 mg/L treatment level, and the LC₅₀ (for dead daphnids) was 1.34 mg/L.

LC50: 1.34 mg/L
EC50: 0.57 mg/L
NOEC: 0.073 mg/L

95% C.I.: 0.78-2.3 mg/L
95% C.I.: 0.43-0.79 mg/L

III. REFERENCES:

- Organization for Economic Cooperation and Development. 1984. OECD Guideline 202: *Daphnia sp.*, *Acute Immobilisation Test and Reproduction Test*. Adopted 4 April 1984. Addendum 3 to C(81) 30 (Final).
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